FLOOR JACK

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of U.S. Patent Application No. 10/150,986, filed May 17, 2002, now pending.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to floor jacks and particularly to floor jacks having a pivot point located before the anchor mechanism.

Description of the Related Art

One of the most common problems in laying an outdoor deck or wood floor is that the wooden boards tend to warp. Due to the nature of woodcutting, wood boards often warp in the horizontal plane, forming a flat, curved board. The construction of wood floors and decks is generally based on laying straight runs of boards forming a square or rectangular structure, curved boards present a problem. A simple but inefficient solution is to restrict the usable materials to only straight boards. A more practical solution is to use a means to straighten out the deck boards as they are installed. By anchoring one side of a board in its proper position, it is possible to bend a board back into a straight position, where it can be fastened to the underlying framing to secure it in place. Several devices have been developed over the years to accomplish this task. For example U. S. Patent No. 14,676 shows a device that clamps to a joist. A long arm extends forward, which is used to contact a given board. A handle extends upward and is pivotable to cause the arm to move forward, pushing against a board, as the handle is depressed. In this way, the board can be straightened. Similar devices are found in U.S. Patent Nos. 81,803, 299,220, 302,416, 375,147,

376,439, 460,790, 764,128, 797,245, 975,566, 1,231,461, 1,354,854, 2,589,404, 2,780,437, 3,524,623, 3,779,515, 4,620,691, 5,248,127, D 353,987, 5,527,014.

All of the above devices use some type of lever action to straighten boards and they all use some type of means to secure the device in place to prevent it from moving. All of them suffer from some problem that makes their use impractical.

There are three main problems with these devices. First, is the type of fastening used to hold the device in place; second, is the leverage system used; and third, is the placement of the pivot point to obtain the leverage. Regarding the type of fastening, there are two main types: clamps and spikes. Clamps are generally placed around joists that lie beneath the floor or deck surface. The clamps are labor intensive to install. Moreover, where access to the joists is limited or restricted, the clamps are useless. Spikes are simpler to install and remove. However, some of the device require such a great deal of holding power (due to their poor leverage as discussed below), they require an excessive number of spikes. Such large number of spikes makes removal of the tool difficult and can do serious damage to the joists. The second problem is the leverage system used. In some of these devices, the devices are long and flat. It appears that some of them can be two feet or more in length. This is a problem when working in tight spaces. Such long machines cannot be used near walls and other obstructions. Finally, most of these devices use a pivot point for the handle that is in front of the fastening mechanism. What this means is that as the handle is activated, it applies a moment force on the tool that pushes the jack portion forward, while simultaneously trying to lift the fastened end up. It is because of this lifting tendency that large clamps and multiple spikes are required for the devices to work at all. In many cases, unless the devices are sufficiently held down, the device merely rotates upward from the back, using the bent board as a fulcrum, instead of operating the other way around.

BRIEF SUMMARY OF THE INVENTION

The instant invention overcomes these problems. It is a bending jack that has one spur or spike for holding it in place and short operational throw and a pivot point located behind the spur. Thus, when the handle is pulled forward, the tendency is to push the spur further into the joist instead of pulling it out. Moreover, because the angle of throw is short, the rotational moment is minimized and most of the force is directed into the board in a horizontal plane.

The device has three main components. The first is a spur assembly. The spur assembly is made of one piece and has a spur head, a spur bar and a spur. At the end of the spur assembly opposite that of the spur is a pivoting handle. The second component is a handle that is secured to the spur bar by a pivot pin or bolt. The third component is a push arm. At the distal end of the push arm is a shoe formed of angle iron or similar material. The proximate end of the push arm is pivotably attached to the handle at a point above that of the spur bar. The push arm is actually two pieces that fit around the spur assembly. Control pins are positioned to limit the amount of travel of the push arm.

The device is used by driving the spur into a joist adjacent to a floor or deck board that needs to be straightened. The handle is held back so that the shoe is near the spur and abuts against the board. The handle is then moved forward, which pushes against the fixed spur. Because the spur is fixed in the joist, the board is moved in the direction of the handle movement, which causes the board to be straightened. Once the board is secured, the device can be pulled from the joist, ready for the next operation.

The key to the success of this invention is that the fulcrum for the handle lies behind the spur, unlike the prior art designs that place the fulcrum either in front of or on top of the spur. With the fulcrum behind the spur, the device remains flat and holds securely when the shoe is straightening the board. The prior art devices have a tendency to lift up from the joist, which makes them impractical to use.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Figure 1 is a side detail view of the invention in place on a joist with the spur ready to be driven into the joist.

Figure 2 is a detail view of the invention with the spur driven into the joist and a board in place, ready for straightening.

Figure 3 is detail view of the invention with the spur driven into the joist and the handle advanced, with the device pushing against a board straightening it.

Figure 4 is a side view of the spur assembly.

Figure 5 is a side view of a push arm and shoe.

Figure 6 is a top view of a push arm and shoe.

Figure 7 is a front view of one embodiment of the handle.

Figure 8 is a detail of the lower handle of the first embodiment.

Figure 9 is a detail showing the handle of fig. 7 and spur assembly at the rear stop position.

Figure 10 is a detail showing the handle of fig. 7 and spur assembly at the front stop position.

Figure 11 is a side detail view of a second embodiment of the invention.

Figure 12 is a perspective view of a third embodiment.

Figure 13 is a perspective view of a fourth embodiment.

Figure 14 is a perspective view of a fifth embodiment.

Figure 15 is an enlarged detail view of an alternative spur construction.

Figure 16 is an enlarged detail view of a second alternative spur construction.

Figure 17 is an enlarged detail view of a third alternative spur construction.

Figure 18 is a perspective view of the sliding member for locking the device.

Figure 19 is a detail view of the sliding member in place on the push arm.

Figure 20 is another alternative handle design.

Figure 21 is yet another alternative handle design.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to figs. 1 and 4-7, the device 1 has three main components. The first component is the spur assembly 2. The second component is the handle 3 and the third component is the push arm and shoe 4.

Figure 4 shows a side view of the spur assembly. In the preferred embodiment, the spur assembly 2 is made of one piece of material, preferably steel. The spur assembly has a spur bar 10, a spur head 12 and a driving spur 14. A hole 15 for a pivot point, as discussed below, is provided near the distal end 16 of the spur bar. Two control pins 18 are also provided and are either formed on or fixedly attached to the spur assembly. These pins protrude from the surface of the spur assembly and limit the travel of the push arm. This limitation keeps the device assembled in a rough operating configuration. Without these pins, the push arm and spur bar may become separated and could flop around. Moreover, these parts have to be reassembled for use, which can slow the job down somewhat. The pins keep the parts together, making it ready to use.

Figures 5 and 6 show side and top views of the push arm-shoe assembly 4. This assembly has a pair of push arms 20 that are welded or otherwise formed on the inner face of a shoe 22. The shoe 22 is an angle piece made of materials common to the art, such as steel. Note that the pair of push arms 20 is attached to the shoe at an angle. This is done to produce maximum transfer of force from the handle during use. A pair of mounting holes 25 is used to attach the push arms to the handle 3.

Referring now to figs. 1 and 7, details of one of the styles of handle 3 are shown. Here, the handle has a long bar 30 that has a padded cap 31 at the top. The base of the handle is bifurcated to receive the spur assembly. Two holes 33 are placed in the bifurcated section 35 of the handle so that the bolt or pin 40 can pass through both the handle and spur bar at hole 15. The bolt or pin 40 is designed to allow the handle 3 to pivot about the spur bar, as discussed below. A third hole 34 is placed above the bifurcated section and is used to secure the push arms to the handle. A bolt or pin 40 that allows the push arms to pivot with the handle is used to secure the handle to the push arms.

Figure 8 shows the lower portion of this handle 3. The bifurcated section 35 is shown having an angled upper surface 36. The angles upper surface 36 provides clearance for the handle as it moves forward and backward.

Figure 9 shows the position of the handle 3 in the rear stop position. The stop positions are used to control the movement, forward and backward, of the handle to allow for movement with limits. In figure 9, the rear stop is the back of the spur bar 10. As shown, the handle 3 is moved back until it contacts the rear spur bar 10. Here is where the angles upper surface is used. As shown, the angled upper surface rests on the top of the spur bar 10 when the handle is in the rear stop position.

Figure 10 shows the front stop position. Here, the front of the handle 3 contacts the top 12 of the spur bar 10. This is the maximum forward movement possible for the device in one movement. Note that without the angled upper surface 36 of the bifurcated portion 35, the handle 3 would stop earlier in its movement. Of course, one is not required to move the handle to the full forward stop position, if the board needs only slight movement to straighten it

As discussed below, the stops vary from embodiment to embodiment but work on the same essential principle. These variations are discussed below.

Figures 11-14 show variations of this basic theme: figure 11 shows a second embodiment. In this embodiment, the device 50 has a handle 51 that is

not bifurcated at the base as the handle of the first embodiment. The spur bar 52 has a spur 52a and a stop 52b. The spur bar 52 is attached to the handle by a pivot 52c as before. A pin 52d can be added to hold the elements together, as discussed above. A shoe 53 is attached to a push arm 54 as before. Here, a pivot 55 attaches the push arm to the handle. In this embodiment, the back 56 of the spur bar 52 is bent back. The bent portion 52b acts as a stop to limit the rear movement of the handle. The forward movement of the handle is limited by the head of the spur, as before.

Figure 12 shows a third embodiment 60. In this embodiment, the handle 61 is positioned between the push arms 63 and spur bars 64, which are doubled and placed around the handle 61 as shown. Pivot pins or bolts 66 are used to pivot the handle. In this embodiment the rear stop is the curved rear portion 64a of the spur bars. The forward stop is the top of the spur 60 as before.

Figure 13 shows a fourth embodiment 70. In this embodiment, the handle 71 is bifurcated as in the first embodiment. The spur bar 72 and spur 73 are also the same as before. The spur bar is attached to the handle 71 by a pivot 74. The main difference in this embodiment is the push bar 75. Here, the shoe is omitted. The push par is a formed piece of material that has a pair of arms 76 that attach to the handle at pivot 77. The nose 78 of the push bar is widened out as shown. This wide portion acts as a shoe to press against a board. The rear and front stops operate as discussed above for the first embodiment.

Figure 14 shows a variation of the fourth embodiment 70. In this embodiment, the handle 81 is not bifurcated. Rather, it is a flat bar that is bent at an offset 82. The offset fits around the top of the spur bar. This offset allows the back of the spur bar to act as a rear stop. The bent portion of the handle 81 makes contact with the back of the spur bar. The front stop is the top of the spur, as in the other embodiments. The handle is held in place with a pivot 80 as before.

Figure 15 shows a view of the bottom of one alternative spur 88. In this view, the spur is bifurcated, producing two points 89. Figure 16 shows a view of the bottom of another alternative spur 90. In this view, the spur 90 has two teeth 91 as shown. Figure 17 shows yet another alternative for the spur. In this view, the spur 95 has two spikes 96 that extend down from the spur body.

Many other configurations of teeth and spikes can be used. These are not preferred because they increase the cost and complexity of the device with little corresponding benefit.

Figures 18 and 19 show details of a locking mechanism, which can be added as well. The purpose of the locking mechanism is simple. Once a plank has been straightened, it must be fastened down to retain that position. Under certain circumstances, if the device cannot be locked the plank may move back into its warped position when the handle is released. The locking system eliminates this possibility. Figures 18 and 19 show details of the preferred locking system. In figure 18 a sliding member 98 is shown. This member is generally rectangular and has an open center 98a and a bent top lip 98b. Figure 19 shows the sliding member in place on the push arm 4 as shown. To use the lock, once the plank is in the proper position. The sliding member is pushed up against the spur head 12 (see the direction of the arrow marked lock in fig. 19) until it pinches between the push arm and the spur head. The sliding member then holds the device in the temporarily fixed position until the lock is released by pushing it in the opposite direction (see the arrow marked unlock in fig. 19).

This locking method is preferred because it is used on the preferred embodiment. Also, because it is easy to manufacture and use. Other locking systems may be used, but these are not preferred. For example, a ratchet system, similar to that shown in Patent No. 764,128. Such systems are well known in the art, but increase the cost of manufacture. Another lock can be a simple hole formed in the bottom of the shoe. The hole can be used to hold a nail or screw, which will hold the shoe in place until the board can be secured. Although this

works, it is not preferred because it requires the extra steps of nailing or screwing a fastener in place and then removing it. Finally, it is also possible to use a cam type lock or a wing nut to tighten the push arm pivot point at the handle connection. Although this is easy to operate, it does take slightly more time than the slide lock and also increases the cost of manufacture of the device.

Figures 20 and 21 show views of other alternative handle designs. Figure 20 shows a handle 130 that has a bent portion 131 near its base. Figure 21 shows an alternative handle design in which the handle 140 has an auxiliary support 141 that is welded or otherwise attached to the bottom of the handle 140. The auxiliary support 141 is attached to the spur bar 142 by a pivot pin 143. Note that the bottom 144 of the handle 140 is angled, as in the first embodiment, to allow for full movement of the handle.

Referring now to figs. 1-3, the operation of the device is shown. Figure 1 shows the device in position on a length of joist 100. The spur 14 is above the joist. A hammer or other implement is used to hit the spur head 12 to drive the spur 14 into the joist. Figure 2 shows the device ready for use. Here, the device is set against a board 101 that needs to be straightened. The handle is pulled back until it stops against the spur bar. The spur can then be driven into the joist 100 below. This is what is shown in fig. 2. To straighten the board 101, the handle is pulled forward. Figure 3 shows this action. As shown, the shoe is moved forward some distance from the spur and its position in fig. 2. Because the spur is driven into the joist, the shoe forces the board 101 to bed in the direction of the handle movement (as signified by the arrow). The user pulls the handle until the board 101 is straight. The board 101 is then secured to the joists to hold it in place. Once the board 101 is secure, the device can be pulled up from the joist and relocated as needed for the next operation. As mentioned above, if the device has a locking mechanism, the locking mechanism is engaged once the board is straight. It is released after the board is secured in place.

The present disclosure should not be construed in any limited sense other than that limited by the scope of the claims having regard to the teachings herein and the prior art being apparent with the preferred form of the invention disclosed herein and which reveals details of structure of a preferred form necessary for a better understanding of the invention and may be subject to change by skilled persons within the scope of the invention without departing from the concept thereof.